UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

CRITICAL AREA PLANTING

(Ac.)

CODE 342

DEFINITION

Establishing permanent vegetation on sites that have or are expected to have high erosion rates, and on sites that have physical, chemical or biological conditions that prevent the establishment of vegetation with normal practices.

PURPOSE

- Stabilize areas with existing or expected high rates of soil erosion by water.
- Restore degraded sites that cannot be stabilized through normal methods.

CONDITIONS WHERE PRACTICE APPLIES

On areas with existing or expected high rates of erosion or degraded sites that usually cannot be stabilized by ordinary conservation treatment and/or management, and if left untreated, could be severely damaged by erosion or sedimentation or could cause significant off-site damage.

Examples of applicable areas are dams, dikes, ditches, channels, mine spoil, levees, cuts, fills, surface-mined areas and denuded or gullied areas where vegetation is difficult to establish by usual planting methods.

CRITERIA

General Criteria Applicable To All Purposes

Species selected for seeding or planting shall be suited to current site conditions and intended uses. Selected species will have the capacity to achieve adequate density and vigor within an appropriate time frame to stabilize the site sufficiently to permit suited uses with ordinary management activities.

Species, rates of seeding or planting, minimum quality of planting stock, such as PLS or stem caliper, and method of establishment shall be specified before application. Only viable, high quality seed or planting stock will be used.

Site preparation and seeding or planting shall be done at a time and in a manner that best ensures survival and growth of the selected species. What constitutes successful establishment, e.g. minimum percent ground/canopy cover, percent survival, stand density, etc. shall be specified before application.

Fertilization, mulching, or other facilitating practices for plant growth shall be timed and applied to accelerate establishment of selected species. If the recommended fertilizer rate exceeds the criteria in Conservation Practice Standard (590) Nutrient Management, appropriate mitigating practices will be installed to reduce the risk of nutrient losses from the site.

Comply with all applicable federal, state, and local laws, rules, and regulations.

Additional Criteria To Restore Degraded Sites

If gullies or deep rills are present, they will be treated, if feasible, to allow equipment operation and ensure proper site and seedbed preparation.

Soil amendments will be added as necessary to ameliorate or eliminate physical or chemical conditions that inhibit plant establishment and

growth. Required amendments, such as compost or manure to add organic matter and improve soil structure and water holding capacity; agricultural limestone to increase the pH of acid soils; or elemental sulfur to lower the pH of calcareous soils shall be included in the site specification with amounts, timing, and method of application.

PLANS AND SPECIFICATIONS

Specifications for applying this practice shall be prepared for each site and recorded and filed using the approved specification sheets or narrative statements in the conservation plan.

Minor grading and shaping may be needed to provide a surface on which desired equipment can safely and efficiently be used for establishment of vegetation and performance of maintenance such as mowing. Loose rock, scattered brush and trees and other obstruction which will interfere with vegetation establishment and maintenance should be removed. Major land shaping will be done in accordance with standards Land Smooth-466, Obstruction Removal-500 or Recreation Land Grading and Shaping-566.

Grading and shaping is not normally required where hydraulic seeding and fertilizing equipment is to be used. However, vertical banks shall be sloped, if possible, to enable plant establishment.

Topsoil

Salvage topsoil during shaping and grading and return to the site, spreading it uniformly over the area, before seeding preparation.

Plant selection

Vegetation for critical areas will be perennial grasses, perennial legumes, trees, shrubs, vines or mixtures. Critical Area Planting-342 is not completed until perennial vegetation is established, therefore short term temporary cover may be necessary (see Table 1).

Perennial plant species approved for use on critical areas are contained in Tables 2, 3 and 4. Species not listed shall be approved by the Agronomist before they are used.

All legume seed shall be inoculated with appropriate nitrogen fixing bacteria prepared specifically for the legume to be inoculated. The inoculant shall be used prior to the expiration date stamped on the package.

Liming materials

Agricultural limestone shall have a neutralizing value of not less than 90 per cent calcium carbonate equivalent and 90 per cent will pass through a 10 mesh sieve and 50% will pass through a 60 mesh sieve.

Selma chalk shall have a neutralizing value of not less than 80 percent calcium carbonate equivalent and 90 percent will pass through a 10 mesh sieve.

Industrial by-products shall have a neutralizing value that is guaranteed on the label.

Liming Rates

A soil test should be used to determine the need for liming materials. However, if a soil test is not made, use 2 tons of agricultural limestone per acre. EXCEPTION: If the cover is tall fescue and clover, then use 3 tons of agricultural limestone or equivalent.

Liming materials are not required for alkaline soils or other areas that have been limed during the preceding 3 years.

Plant Nutrients

Sources of plant nutrients may be animal or poultry manure, agricultural by-products or commercial fertilizer.

Animal and poultry manure and other agricultural by-products should be analyzed for nutrient content. When a laboratory analysis is not available use he book values in the standard Nutrient Management-590 for estimated available nutrient content.

Plant Nutrient Application Rates

Plant nutrients for a particular crop should be applied according to a current soil test report from Auburn Soil testing Laboratory or other laboratories that make recommendations based on soil analysis. A soil test shall be considered current if made within the prior 3 year period. When a soil test is not made, use the following rates of plant nutrients.

- For grasses seeded alone use 30 lbs. nitrogen, 100 lbs. P205, and 100 lbs K20 per acre at planting. Apply 30 lbs. of

additional nitrogen when grass has emerged and begun growth.

- For grass and legume mixtures, use 30 lbs. nitrogen, 100 lbs. P205 and 100 lbs. K20 per acre.
- For legumes seeded alone use 100 lbs. P205 and 100 lbs. K20. per acre.
- For woody ground covers, shrubs vines and trees planted on prepared seedbeds apply 100 lbs. nitrogen, 100 lbs. P205 and 100 lbs. K20 per acre in 3 split applications during the growing season.

Application of Soil Amendments

Where conventional seeding methods are used, application of soil amendments will be as follows:

- Soil amendments (liming materials and plant nutrients) will be uniformly applied and thoroughly mixed into the soil during seedbed preparation for broadcast or drilled planting.
- When holes of furrows are used for individual plants, plant nutrients will be well mixed with the soil used to fill around plants or placed in separate holes or furrows 3 to 6 inches to the side of plants. Side placement will be used when dibbles are used for planting.
- Liming materials will be broadcast on top of the ground before preparing holes or furrows for individual plants on unprepared seedbeds.

When hydro seeding equipment is used, application of soil amendments will be as follows:

- Commercial fertilizer materials only will be applied through hydro seeding equipment. Fertilizer will not be added to the seed-inoculant mixture but will be applied in a separate operation. The fertilizer will be mixed with water in the hydro seeder and applied after the seedlings are established.
- Liming materials may be added to the seed-inoculant mixture and applied at seeding or it may be applied with the fertilizer mixture.

Seedbed Preparation

Seedbed preparation is not required where hydraulic seeding or conservation tillage will be used to establish vegetation.

When conventional seeding methods are used, seedbed preparation will be as follows for broadcast or drilled plantings:

- Tillage, as a minimum, shall adequately loosen the soil to a depth or at least 6 inches; alleviate compaction; and smooth and firm the soil for the proper placement of seed, sprigs or plants.
- Tillage will be done on the contour where feasible.

When conventional planting methods are used, seedbed preparation for individual plants will be as follows:

- Prepare seedbeds by digging holes, opening furrows, using dibbles or other means appropriate for the plants to be used. Openings shall be large enough to accommodate plant roots without crowding or bending the tap root.
- Where pine seedlings are to be planted on compacted soils, subsoil under the row 24 inches deep on the contour 4 to 6 months prior to planting. Subsoiling should be done when soil is dry.

Planting Seeds

Conventional seeding will be done on a freshly prepared and firmed seedbed. Distribute the seed uniformly over the area to be treated with a cultipacker seeder, drill, rotary seeder, other mechanical seeder, or by hand seeding. Cover the seed with soil material to the proper seeding depth (Tables 1 and 2) during planting with a drill or cultipacker seeder or if seed are broadcast on the surface use a cultipacker or other suitable equipment to cover the seed immediately after seeding.

No-till seeding may be done in killed cover crops or in temporary cover that is sparse enough to allow adequate growth of the permanent species. The appropriate seeding equipment will be used for no-till planting.

Where hydraulic seeding equipment is used, mix seed, inoculant if required, and a seed carrier with water and apply as slurry,

uniformly over the area to be treated. The seed carrier will be a cellulose fiber, natural wood fiber or cane fiber mulch material which is dyed an appropriate color to facilitate uniform application of seed. Use the correct inoculant at four times the rate specified on the package. Fertilizer will not be mixed with the seed-inoculant mixture, but may be applied in a separate operation after seedlings are established. The seed-inoculant mixture will be applied within one hour after mixing.

Planting – Individual Plants

Trees, shrubs, vines and sprigs can be planted with appropriate planters or hand tools. Plants will be set in a manner that will avoid crowding the roots. The soil shall be firmed about the roots. If possible, apply water to settle soil around the roots and prevent drying out of shrubs, vines and sprigs.

Nursery stocks plants shall be planted at the same depth or slightly deeper than they grew at the nursery. The tips of vines and sprigs must be at or slightly above the ground surface.

Mulch

Use mulch on all slopes steeper than three percent; when grass or legumes are planted so late in the fall and winter that germination cannot be expected until spring; on dams and spillways; and on road banks.

Irrigation

Use irrigation when available and needed to insure establishment. Irrigation will be applied at a rate that will not cause erosion.

Considerations

Native species or mixes that are adapted to the site and have multiple values should be considered.

Avoid species that may harbor pests. Species diversity should be considered to avoid loss of function due to species-specific pests.

Establishment of vegetation on critical areas will reduce sediment related pollutants delivered to surface waters. Plants may take up more of the nutrients in the soil, reducing the amount that can leach into ground water.

During grading and shaping, seedbed preparation, and until vegetation is well established, large quantities of sediment and associated chemicals can be washed into surface waters prior to plant establishment.

When vegetation is well established on large critical areas, as in mined land reclamation, there can be a reduction of surface runoff and increased infiltration and percolation into ground water.

The selection of plant species for use on critical areas should be based on site specific factors. Factors that should be considered are type of soils, climate, establishment rate and management and management requirements of the vegetation. Other factors that may be important are wearing, mowing tolerance and salt tolerance of vegetation.

Endophyte infected tall fescue appears to establish quicker and have better survival under adverse conditions than endophyte free tall fescue.

Conservation tillage methods should be considered for certain plant species on land subject to excessive erosion during establishment.

Use of irrigation will greatly improve the success of establishment.

Straw bales placed on the contour may be used to aid in control of rills and excessive erosion on long slopes. Each bale should be anchored with 2 stakes and should be firmly butted to adjacent bales.

Temporary cover can provide short-term protection before establishing perennial vegetation. Certain plant species that can be used for temporary cover will produce large quantities of residue which will provide mulch for establishment of the perennial cover.

Pesticides may be needed to adequately establish and maintain vegetation on critical areas. Refer to the standard, Pest Management-595 for integrated pest management measures.

Where wildlife is a consideration, plant species providing needed habitat elements of cover and food should be used.

PLANS AND SPECIFICATIONS

This practice shall be recorded using narrative statements in the conservation plan, approved

specification sheets, guide sheets, or other acceptable documentation.

OPERATION AND MAINTENANCE

Use of the area shall be managed as long as necessary to stabilize the site and achieve the intended purpose.

Control or exclude pests that will interfere with the timely establishment of vegetation. Use temporary or permanent fences to protect areas that may be damaged by livestock and traffic

Inspections, repairs that include reseeding or replanting, fertilization and pest control may be needed to insure that this practice functions as intended throughout its expected life.

REFERENCES

Blaser, R. E. Part II. Development and Management of Low Maintenance Vegetation for Erosion Control along West Virginia Highway Corridors In: Project 55: Low Maintenance Vegetation for Erosion Control...1980. West Virginia Dept. Of Highways, U.S. Dept. of Transportation, and the Federal Highway Administration.

Dickens, R. and W. J. Johnston. Comparison of Mulch Materials for Highway Vegetation establishment. Bulletin 499. 1978. Agricultural Experiment Station /Auburn University.

Diseker, E.G., E. C. Richardson, and B.H. Hendrickson, Road bank Erosion and Its Control in the Piedmont Upland of Georgia. ARS-41-73. 1963. USDA, Agricultural Research Service, Washington, D. C.

Kentucky Guide for Classification, Use and Vegetative Treatment of Surface Mine Spoil. Revised 1973. USDA, Soil Conservation Service, Lexington, Kentucky.

TABLE 1

Commonly used Plants for Temporary Cover

Species	Seeding Rate/Acre	Seeding Depth	Seeding Dates		
			North	Central	South
Barley	3 bu	1 in	Sep 1-Oct 30	Sep 1-Oct 30	Sep 1-Oct 30
Oats	4 bu	1 in	Sep 1-Oct 15	Sep 1-Oct 30	Sep 1-Oct 30
Rye	3 bu	1 in	Sep 1- Nov 1	Sep 15-Nov 15	Sep 15-Nov 15
Wheat	3 bu	1 in	Sep 1-Nov 1	Sep 15-Nov 15	Sep 15-Nov 15
Ryegrass	30 lbs	1/4 in	Aug 15-Oct 1	Sep 1-Oct 15	Sep 1-Nov 1
Millet, Browntop	40 lbs	1/2 in	May 1-Aug 1	Apr 1-Aug 15	Apr 1-Aug 15
Sudangrass	40 lbs	3/4 in	May 1-Aug 1	Apr 15-Aug 1	Apr 1-Aug 15
Sorghum-Sudan Hybrids	40 lbs	3/4 in	May 1-Aug 1	Apr 15-Aug 1	Apr 1-Aug 15
Bermudagrass, Common	10 lbs	1/4 in	Apr 1-Jul 15	Mar 15-Jul 15	Mar 1-Jul 15
Fescue, Tall	40 lbs	1/4 in	Sep 1-Nov 1	Sep 1-Nov 1	Sep 15-Nov 15

TABLE 2

Perennial Grasses, Legumes and Mixtures; Seeding Rates; and Planting Dates for Critical Area Plantings on Prepared Seedbeds

Species	Seeding* Rate/Acre	Planting Depth (inches)	Planting Dates and Adapted Area North	Central	South	Remarks
Bahiagrass, Pensacola	40 lbs	1/4 - 1/2	---*	Mar 1-Jul 1	Feb 1-Nov 1**	Low growing, sod forming & slow to establish. Tolerant to droughty, low fertility sites.
Bermudagrass, Common	10 lbs	1/4 -1/2	Apr 1-Jul 15	Mar 15-Jul 15	Mar 1-Jul 15	Quick cover, low growing and sod forming. Intolerant of shade, low fertility & poor management.
Bahiagrass, Pensacola & Common Bermudagrass	27 lbs 7 lbs	1/4-1/2	---	Mar 1-Jul 15	Mar 1-Jul 15	Bermuda will provide quick cover until bahia is established.
Bermudagrass, Sprigs (Forage Type) or Common	30 bu	2-6	Apr 1-Jul 15	Mar 15-Jul 15	Mar 1-Aug 15	All hybrids not adapted for North Alabama. Hybrid Intolerant to low fertility & poor management.
Bermudagrass, Hybrid (Lawn types)	Solid Sod	---	Anytime during year	Anytime during year	Anytime during year	Usually needs irrigation to establish.
Bermudagrass, Hybrid (Lawn Types)	Sprigs - 1 ft.	1/4-1/2	Mar 15-Aug 1	Mar 1-Aug 15	Feb 15-Sep 1	Usually needs irrigation to establish.
Fescue, Tall	D - 40 lbs*** B - 50 lbs	1/4-1/2	Mar 1-Apr 15 Sep 1-Nov 1	--- Sep 1-Nov 1	--- Sep 15-Nov 15	Good shade tolerance and does well on wet sites. Slow to establish. Does not establish well from spring planting.
Fescue, Tall & White Clover	D-40 lbs, B - 50 lbs D & B - 3 lbs	1/4-1/2	Mar 1-Apr 15 Sep 1-Nov 1	--- Sep 1-Nov 1	--- Sep 15-Nov 15	Good shade tolerance. Does well on wet sites and clay soils of Black Belt.
Old World Bluestem	5 lbs PLS***	0-1/4	---	Black Belt soils Mar 15-Jun-15	---	Kings Ranch or Plains Bluestem. Adapted to chalky black belt soils. Tolerant of poor mgt.
Sericea	D - 40 lbs B - 60 lbs	1/4	Mar 15-May 15 Jun 15-Jul 15	Mar 1-May 15 Jun 15-Jul 15	Feb 15-May 1 Jun 15-Jul 15	Suited for low maintenance. Well adapted to low fertility soils and mine spoil. Slow to establish.

TABLE 2 (cont'd) - Perennial Grasses, Legumes and Mixtures; Seeding Rates; and Planting Dates for Critical Area Plantings on Prepared Seedbeds

Species	Seeding* Rate/Acre	Planting Depth (inches) North	Planting Dates and Adapted Area Central	South		Remarks
Sericea & Common Bermudagrass	D-40 lbs, B-60 lbs D & B - 10 lbs	1/4	Mar 15-May 15 Jun 15-Jul 15	Mar 1-May 15 Jun 15-Jul 15	Feb 15-May 1 Jun 15-Jul 15	Bermudagrass will provide quick cover until Sericea is established.

* Bahiagrass planting in North Alabama is limited to counties contiguous to Central Alabama plus St. Clair, Calhoun, & Cleburne.

** Fall planting of bahia should contain 45 pounds of small grain to provide cover during winter months.

*** D - drilled, B - broadcast, and PLS - pure live seed.

**** Tall fescue plantings in South Alabama are limited to land capability subclass w soils.

Notes: 1. Legume seed will be treated with the inoculant specific for the species of legume.

2. Seeding rates for FSA and State cost share practices shall be the rate specified in the program handbook.

TABLE 3

Woody Plants, Shrubs, and Vines for Critical Area Planting

Species	Spacing	Mature Height	Remarks
Giant Reed Cane *(Arundo donax)*	1 ft apart in 4 ft rows	8-12 ft	Adapted to gully bottom. Use cuttings with 6 or 7 nodes. Plant upright and leave half the nodes above ground.
Japanese Honeysuckle *(Lonicera japonica)*	2-3 ft centers	12-18 ft	A vine which will climb. May be used on slopes as steep as 1 to 1. Good wildlife plant. Will tolerate light shade.
Memorial Rose *(Rosa weuchuriana)*	3-4 ft centers	2 ft	May be used on slopes as steep as 1 to 1. Rampant grower.
Periwinkle *(Vinca spp.)*	1-2 ft centers	6-12 in	May use on slopes as steep as 1 to 1. Will spread. Tolerant to semi-shade. Blue flowers in Spring.
Shore Juniper *(Juniperus conferta)*	5 ft centers	2-3 ft	Emerald Sea or Blue Pacific cultivators are good. Adapted to wide range of soils. Tolerant of light shade.
Shrub Lespedeza *(Lespedeza bicolor & L. thunbergii)*	2 ft in rows 3 ft apart	8-12 ft	Adapted to well drained to somewhat poorly drained soils. Best adapted to coastal plains soils. Wildlife improvement plants.

Notes: 1. Woody plants, shrubs or vines may take 2 years or more to provide complete cover; therefore, the area should be well mulched at planting and the mulch maintained until cover is obtained.

2. Plants would be set in late fall and winter (December 1 to March 1). Container grown plants may be planted anytime of the year if they can be watered until established.

TABLE 4

Trees for Critical Area Planting

Soil Type	Species	Spacing	Remarks	Ph Range
Acid soils	Loblolly pine	6 ft x 8 ft	Adapted to sandy, loamy, and clayey soils.	4.5 - 6
	Longleaf pine	6 ft x 8 ft	Best on sandy soils.	
	Virginia pine	6 ft x 8 ft	Adapted to wide range of sites.	4.5 - 6
	Slash pine	6 ft x 8 ft	Plant only in South Alabama. Well suited to wet, sandy soil.	4.5 - 6
	Black Alder	6 ft x 8 ft	Best adapted to mine spoil	4 - 7
Alkaline soils	Eastern redcedar	6 ft x 8 ft	Adapted to chalky Black Belt soils.	6 – 7.5
	Cottonwood	6 ft x 8 ft	Adapted to mine spoil & wet sites.	6 – 7.5
	Sycamore	6 ft x 8 ft	Suited for mine spoil & wet sites.	6 – 7.5
	Black alder	6 ft x 8 ft	Best adapted to mine spoil.	4 - 7
	Green Ash	6 ft x 8 ft	Suited for low rich moist soils	6 – 7.5

Notes: 1. Planting dates are December 1 to March 15. These dates may be extended if trees are in containers or seedlings have been kept in cold storage.

2. Other trees and shrubs with wildlife value may be interplanted to enhance wildlife.

3. The 6 ft x 8 ft spacing is approximately 900 trees per acre.

GEOGRAPHICAL AREAS FOR SPECIES ADAPTATION AND SEEDING DATES

NRCS, AL
September 2004